

Apparatus for conveying fruits and vegetables

The invention concerns an apparatus for conveying fruit and vegetable products, particularly grapes, from a loading zone to an unloading zone in which the products will be further processed.

In winemaking it is already known to unload the grapes that have been deposited in trailers of tractors after been harvested, inside a hopper.

At the base of the hopper is provided a screw-feeder which ensures, by the rotation around its own axis, that the mass of grapes is shifted from the bottom of the hopper towards an outlet hole.

During rotation of the screw-feeder, also the grapes that are immediately above the screw-feeder are conveyed towards the outlet zone, not only the grapes that are directly in contact with the screw-feeder.

In fact, the bunches contained in the screw-feeder are stacked with the bunches above them, thus dragging the latter towards the outlet zone.

The mass of grapes that is not inside the screw-feeder but is nevertheless conveyed towards the outlet zone, accumulates against the wall in which the outlet hole is obtained, without leaving the hopper.

The excess grapes violently knock against the wall in which the outlet hole is obtained, and it is thoroughly cut when a part of the grapes comes out towards the unloading zone, but the remaining part remains confined into the hopper.

The grapes, therefore, undergo traumatic actions, that cause consequent extraction of the sap from the stalks and from the skin of each grape, this negatively affecting the properties and the final quality of the wine to be obtained.

A further drawback of the state of the art is due to the large piles of grapes that accumulate, for the reasons above-explained, near the outlet wall of the hopper.

Very high pressures develop where the grapes accumulate, and can happens that whilst the mass of grapes arranged near the screw-feeder is conveyed towards the outlet zone, the mass of grapes arranged above is so pressed against the side walls of 5 the hopper to can not descend towards the screw-feeder.

Are thus created 'bridges' of pressed grapes that prevent the screw-feeder from being fed and that can be removed only by the manual intervention of the operator.

10 A yet further drawback of the state of the art is due to the fact that, owing to the high pressure and the traumatic action exerted on the grapes inside the hopper, at this zone of the apparatus, the grapes are already partially pressed and consequently must is formed.

15 Said must subsequently goes on to the incidental stalk-remover arranged downstream the hopper for separating the individual grapes from the stalks. If, in this phase, an excessive quantity of must is produced, only a part of the must may flow out through the stalk-remover, passing through a plurality of holes obtained on a cylindrical shell of the stalk-remover 20 through which can exit the individual grapes but not the stalks. The remaining part of the must is dragged towards the outlet of the stalk-remover together with the stalks to be eliminated and is therefore lost.

25 One object of the invention is to improve the apparatuses for conveying fruit and vegetable products, particularly grapes.

A further object is to provide apparatuses for conveying fruit and vegetable products in which said products are treated in a soft and non-traumatic manner.

30 A further object of the invention is to provide apparatuses for conveying fruit and vegetable products that, during operation, require limited interventions by an operator.

A yet further object of the invention is to provide apparatuses for conveying fruit and vegetable products that do

not cause excessive separation between solid and liquid parts of said products at the outlet of the apparatus.

In a first aspect of the invention, is provided an apparatus for conveying fruit and vegetable products, particularly 5 grapes, comprising hopper means suitable for receiving said products and screw-feeder means suitable for conveying said products towards an outlet zone, characterised in that said screw-feeder means has a variable pitch.

In one advantageous embodiment, the pitch of the screw-feeder 10 means is growing proceeding towards said outlet zone.

The screw-feeder with variable pitch means ensures that the product is processed in different ways inasmuch as the quantity of products moved by the greater pitch portions of the screw-feeder means is greater than the quantity of 15 products moved by the lesser pitch portions.

Providing screw-feeder means with a pitch growing towards the outlet zone, it is possible to pick up from the regions of the hopper means near the outlet zone a quantity of product that is greater than the quantity picked up from the regions of the 20 hopper means that are farer from said outlet zone. In this way, accumulation of the products in the hopper means near the outlet zone, and the 'bridge' effect are avoided. Furthermore, is ensured a non-traumatic treatment of the fruit and vegetable products, which are not subjected to excessive 25 pressure or to cutting actions.

In a second aspect of the invention, is provided the use of screw-feeder means with variable pitch for conveying fruit and vegetable products, particularly grapes.

Thanks to this second aspect, transport of the fruit and 30 vegetable products can be improved without the latter leading to undesirable accumulations or being subjected to excessively harsh treatment.

The variable pitch screw-feeder means can also be used in prior-art apparatuses for conveying fruit and vegetable

products replacing the constant pitch screw-feeders of the state of the art.

This enables to transform the known apparatuses into efficient apparatuses that do not have the above-listed drawback, with 5 limited investments and reduced installation times, inasmuch as it is not necessary to replace the entire apparatus but only the screw-feeder means thereof.

In order that the invention may be clearly and completely disclosed, reference will now be made, by way of examples that 10 do not limit the scope of the invention, to the accompanying drawings, in which:

Figure 1 is a view from above of the apparatus according to the invention;

Figure 2 is a front view of the apparatus according to the 15 invention;

Figure 3 is a side view of the apparatus of Figure 1.

Figures 1 and 3 show an apparatus 1 for conveying fruit and vegetable products, in particular grapes, in a conveying direction F towards an outlet zone 9.

20 The apparatus 1 comprises a hopper 2 suitable for receiving grapes unloaded from tractors whereupon they were deposited after being harvested in the vineyards. The hopper 2 is delimited in a direction parallel to the conveying direction F by a fixed wall 3 and by a hinged side 4 that is opened and 25 folded downwards when the grapes have to be unloaded from an arriving tractor. The hopper 2 is furthermore delimited, in a direction transversal to the conveying direction F, by two fixed panels 5.

At the bottom part of the hopper 2 there is provided a screw- 30 feeder 6 comprising a helical surface 7 that winds on a shaft 8 extending along a longitudinal axis X.

The screw-feeder 6 is provided with a variable pitch, in particular a pitch growing towards the outlet zone 9.

In a preferred embodiment, shown in Figure 2, can be identified in the screw-feeder 6 different zones having different pitches from one another. In particular, starting from the fixed panel 5 farer from the outlet zone 9, can be 5 identified a first portion 10 of the screw-feeder 6 having a first value  $p_1$  of pitch about of 200 mm. Subsequently can be identified a second portion 11 in which the pitch has a second value  $p_2$ , comprised between 200 and 250 mm, and a third portion 12 in which the pitch has a third value  $p_3$  of about 10 300 mm. Finally, near the outlet zone 9, can be identified a fourth portion 13 of the screw-feeder 6 in which the pitch has a fourth value  $p_4$ , of 400 mm. Experimental tests have shown that these values enable the fruit and vegetable products to be conveyed in an optimal manner towards the outlet zone 9, 15 using a screw-feeder 6 having an external diameter of about 400 mm.

Motor means, not shown, is also provided in order to actuate the rotation of the screw-feeder 6.

After the grapes to be transformed into wine have been 20 harvested, they are brought by tractors up to the hopper 2; said tractors stop on a plate connected to weighing means to determine the weight of the harvested product.

The hinged side 4 of the hopper 2 has been previously folded 25 downwards to facilitate the entry of the grapes. After the tractor has been made integral with the above-described plate by means of chains, said plate is tilted so that the grapes contained in the trailer pass directly into the hopper 2.

At this point, the variable pitch screw-feeder 6 is rotated by the motor means in such a way as to direct the grapes towards 30 the outlet zone 9. As the quantity of grapes conveyed by the screw-feeder 6 is proportional to the pitch of the screw-feeder 6, the lesser pitch portions convey a smaller quantity of grapes than those conveyed from the greater pitch portions. The quantity of grapes picked up from regions far from the

outlet zone 9 is therefore less than the quantity picked up from regions near said outlet zone 9, and this avoids great accumulations of grapes to be formed near the outlet zone 9. The grapes leaving the hopper 2 can be feed into a known stalk-remover in which the individual grapes are separated from the stalk, before being directed to the subsequent phases of the vinification process.

Apparatuses for conveying fruit and vegetable products, particularly grapes, of the known type with a screw-feeder having a constant pitch can rapidly be converted into apparatuses like those described in Figures 1 to 3 by simply replacing the constant pitch screw-feeder with a variable pitch screw-feeder similar to the screw-feeder 6.